

WE CLAIM:

1. A compound of molecular formula I,



wherein $2.2 < x < 4$, $0 < y < 2$ and $z \geq 0$.

2. A compound according to Claim 1, wherein formula I ,
 $2.2 < x < 4$ and $0.1 \leq y \leq 1.75$.
3. A compound according to Claim 1, wherein formula I ,
 $2.2 < x < 3.6$ and $0.1 \leq y \leq 1.75$.
4. A compound according to Claim 1, further characterised by the normalised crystallographic unit cell volume, when indexed in hexagonal symmetry to a R-3m structure, being smaller than that of LiCrO_2 ie. smaller than 104.9 cubic Angstroms.
5. A compound according to Claim 1, further characterised by the average cation to anion bond distance being smaller than that of LiCrO_2 .
6. A compound according to Claim 1, wherein formula I, $x = 2.8$ to 3.4 , $y = 0.49$ to 1.46 and $z = 0.5$ to 2.6 .
7. A compound according to Claim 1, wherein formula I, $x = 2.8$ to 3.4 , $y = 1.01$ to 1.46 and $z = 0.9$ to 1.9 .

8. A compound according to Claim 1, wherein formula I, $x = 2.8$ to 3.3 , $y = 0.49$ to 0.93 and $z = 0.5$ to 2.6 .
9. A compound according to Claim 1, wherein formula I, $x = 2.04$ to 3.44 , $y = 0.51$ to 1.34 and $z = 0.07$ to 1.86 .
10. A compound according to Claim 1, wherein formula I, $x = 2.25$ to 3.44 , $y = 0.98$ to 1.34 and $z = 0.37$ to 1.86 .
11. A compound according to Claim 1, wherein formula I, $x = 3.15$ to 3.30 , $y = 0.89$ to 1.09 and $z = 1.00$ to 1.54 .
12. A compound according to Claim 1, wherein formula I, $x = 2.95$, $y = 1.09$ and $z = 0.11$, further characterised by a normalised unit cell volume of 102.1 cubic angstroms and being indexed to a hexagonal crystallographic unit cell having dimensions $a = 2.87\bar{6}$ angstroms, $b = 2.87\bar{6}$ angstroms, and $c = 14.2\bar{5}$ angstroms.
13. A cathode for use in a secondary lithium ion electrochemical cell, comprising as active material a compound of formula I as defined in Claim 1.
14. A secondary lithium ion electrochemical cell comprising, a lithium intercalation anode, a suitable non-aqueous electrolyte including a lithium salt, a cathode as defined in Claim 13, and a separator between the anode and cathode.
15. An electrochemical cell according to Claim 14, wherein the anode comprises a material selected from the group consisting of transition metal oxides, transition metal

sulphides and carbonaceous materials, and wherein the electrolyte is in liquid form and includes a suitable organic solvent.

16. An electrochemical cell according to Claim 15, wherein the lithium salt is selected from the group consisting of LiAsF_6 , LiPF_6 , LiBF_4 , LiClO_4 , LiBr , LiAlCl_4 , LiCF_3SO_3 , $\text{Li}(\text{CF}_3\text{SO}_2)_3$, $\text{LiN}(\text{CF}_3\text{SO}_2)_2$, and mixtures thereof.
17. An electrochemical cell according to Claim 16, wherein the organic solvent is selected from the group consisting of propylene carbonate, ethylene carbonate, 2-methyl tetrahydrofuran, tetrahydrofuran, dimethoxyethane, diethoxyethane, dimethyl carbonate, diethyl carbonate, methyl acetate, methylformate, γ -butyrolactone, 1,3-dioxolane, sulfolane, acetonitrile, butyronitrile, trimethylphosphate, dimethylformamide and other like organic solvents and mixtures thereof.
18. An electrochemical cell according to Claim 17, wherein the anode comprises a carbonaceous material.
19. An electrochemical cell according to Claim 18, wherein the anode comprises a graphitic carbon.
20. An electrochemical cell according to Claim 18, wherein the electrolyte is a solid or gelled polymer.

21. An electrochemical cell according to Claim 18, wherein the electrolyte comprises 1 M LiPF_6 in a 1:1 mixture of ethylene carbonate and dimethyl carbonate.
22. An electrochemical cell according to Claim 19, wherein formula I, $x = 2.2$ to 4, $y = 0.1$ to 1.75 and $z \geq 0$.

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